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10/673,173	09/30/2003	Yukihiko Nakata	243339US3	1250
22850 7590 10/10/2008 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
BUEKER, RICHARD R				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/673,173

Applicant(s)

NAKATA ET AL.

Examiner

Richard Bueker

Art Unit

1792

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 8, 9 and 11-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 9 and 11-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/S5108)
Paper No(s)/Mail Date 2/04/08
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Claims 5 and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 5 recites a checkerboard pattern, which applicants argue is supported by the "check pattern" of their fourth embodiment shown in Fig. 5. It is noted, however, that the embodiment shown in Fig. 5 does not include the beams that are now recited in claims 1 and 2, and therefore claim 5 as now written describes an apparatus that was not disclosed in the specification as originally filed. Applicant has argued that Fig. 5 includes beams. This argument is not convincing because a review of Fig. 5 shows that there are no beams as presently claimed, and applicants' specification does not state that there are beams in Fig. 5.

Claim 18 recites a variety of groups of gases, but the claim as written is vague and indefinite because of the use of the phrase "and a gas" in lines 5 and 8, and also because of the manner in which commas are used to separate the various groups of recited gases. Because of the unclear manner in which claim 18 is written, it is not clear which gases or mixtures of gases are required to be present in the reaction chamber.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 8, 9, 11, 16-19 and 21-23 are rejected under 35 U.S.C. 103(a) as obvious over Sakuma I (WO 01/82348) or Sakuma II (6,891,131), either one in view of Hauf (6,600,138) and/or Kajikawa (JP 03-122282), and in further view of Hiramoto (5,510,158), Maeda (5,679,165), Murakami (5,431,738) and/or Miller (6,521,048).

Sakuma I and II have equivalent disclosures and the discussion below will refer to Sakuma II (6,891,131). Sakuma (see fig. 9) discloses a substrate processing apparatus having a light source, a light transmitting window and a reaction chamber in which a substrate to be processed can be placed. Frame 66 and frames 72 of Sakura's apparatus form plural windows as claimed by applicants. The frame of Sakuma is a support member positioned on one surface of the reaction chamber, and having beams fixed on the support member as now claimed in claims 1 and 2. Sakuma (col. 5, lines 19-32, for example) teaches that the purpose of his support member is to reduce the thickness of the transmitting window and thus reduce the window's heat capacity. See col. 8, lines 19-58 of Sakuma, for example. Sakuma teaches that the windows can be provided in a variety of shapes and patterns, including a lattice pattern (col. 8, lines 39-44) which creates windows arranged in a "checkerboard pattern" as recited in claim 5.

Hauf (see Figs. 1 and 16) also discloses a substrate processing apparatus having a light source, a light transmitting window and a reaction chamber in which a substrate to be processed can be placed. Hauf teaches that a single quartz window as shown in his Fig. 1 can be replaced by a plurality of quartz liners 166 (see Fig. 16) that are optically transparent (i.e. windows). The windows 166 are sealed by seals 169 to the inner wall 168, which is a support member. Hauf (see abstract) teaches that "(t)hin

planar quartz liners may also be interposed between the lamps and the substrate. By eliminating thick planar quartz windows commonly used to isolate the lamps in prior art RTP systems, higher processing rates and improved reliability can be obtained." Thus, Hauf teaches that his plural windows 166 and support member 168 serve the same purpose as Sakuma's (see Fig. 9, for example) window 68 and support member 66 having beams 72.

Kajikawa (see the abstract and Figs. 1 and 2) also teaches that it is desirable to replace one large window with a plurality of smaller windows wherein the smaller windows are supported by support members that are beams positioned between the windows and the substrate holder. The teachings of Kajikawa are analogous to the teachings of Hauf. Kajikawa also teaches (see Fig. 1A) that the windows can be arranged in a "checkerboard pattern" as recited in claim 5.

It would have been obvious to modify the apparatus of Sakuma by providing plural windows on the support member as taught by Hauf and/or Kajikawa because Hauf and Kajikawa teach that a plurality of windows successfully accomplish the purpose desired by Sakuma, which is to reduce the thickness of a lamp window in a substrate processing apparatus.

Sakuma's apparatus also includes a substrate rotation means for improving the uniformity of radiation (col. 1, lines 31-35 and col. 2, lines 11-13, for example) onto the substrate per unit time. Sakuma does not discuss swinging the substrate holder back and forth along a straight line path relative to the windows for the purpose of improving the uniformity of radiation onto the substrate per unit time. Hiramoto (see Fig. 9 and col.

12, lines 6-19 and col. 12, lines 60-67), Maeda (see col. 8, lines 17-26, col. 9, lines 30-32 and claim 6), Murakami (5,431,738) (Fig. 7) and Miller (6,521,048) (Fig. 17), all teach the step of moving a substrate in a linear reciprocating motion, which is a linear swinging motion, for the purpose of causing a more uniform treatment of a substrate in a processing apparatus. These references teach that a swinging motion is a well-known alternative to or addition to the more common rotating motion illustrated by Sakuma. Hiramoto in particular teaches that a linearly swinging motion ensures uniformity of lamp radiation on the surface of a substrate to be treated with lamp radiation. It would have been obvious to use such a swinging motion as an alternative to, or in addition to, the rotation of Sakuma, because all of the secondary references make clear that reciprocation or swinging was an art recognized equivalent to rotation, or an art recognized improvement to rotation used alone, for the purpose of increasing uniformity of treatment of a substrate in a processing apparatus. It would have been further obvious to use such a swinging motion as an alternative to, or in addition to, the rotation in the lamp heating apparatus of Sakuma, because Hiramoto teaches that a linearly swinging motion ensures uniformity of lamp radiation on the surface of a substrate to be treated with lamp radiation.

Regarding claim 17, Sakuma teaches (col. 14, lines 8-11) the use of his apparatus for oxidation processes. Furthermore, Hauf (see col. 1, lines 22-30) teaches that an oxynitride layer can be formed on a semiconductor device in Sakuma's type of heating apparatus. An oxide or oxynitride layer is formed by active oxygen atoms that are formed by the decomposition of an oxidizing compound such as the nitric oxide

described by Hauf, wherein the decomposition occurs when the light from the light source is irradiated into the reaction chamber as recited in claim 17.

Regarding claim 18, Sakuma (col. 12, lines 28-32) teaches the step of using silane for depositing polysilicon, which is a semiconductor film.

Regarding claims 21-23, the windows of Sakuma are juxtaposed. It is noted that the dictionary definition of "juxtaposed" is "placed side by side" or "adjacent".

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma I (WO 01/82348) or Sakuma II (6,891,131), either one in view of Hauf (6,600,138) and/or Kajikawa (JP 03-122282), and in further view of Hiramoto (5,510,158), Maeda (5,679,165), Murakami (5,431,738) and/or Miller (6,521,048) for the reasons discussed above, and taken in view of Iwasaki (5,174,881) and Maeda (5,314,538) who teach that it is desirable to place another chamber adjacent to a lamp processing chamber of the type taught by Sakuma. It would have been obvious to one skilled in the art to adapt the apparatus of Sakuma by placing it adjacent another chamber to allow plural processing steps as taught by Iwasaki and Maeda (5,314,538).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma I (WO 01/82348) or Sakuma II (6,891,131), either one in view of Hauf (6,600,138) and/or Kajikawa (JP 03-122282), and in further view of Hiramoto (5,510,158), Maeda (5,679,165), Murakami (5,431,738) and/or Miller (6,521,048) for the reasons discussed above, and taken in view of Takasu (5,261,961) or Shinriki (6,143,081), who teach that it is desirable to place another chamber adjacent to a lamp processing chamber of the type taught by Sakuma. It would have been obvious to one skilled in the art to adapt

the apparatus of Sakuma by placing it adjacent another chamber to allow plural processing steps as taught by Takasu or Shinriki.

Claims 13, 18, 19, 20/16 and 20/18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma I (WO 01/82348) or Sakuma II (6,891,131), either one in view of Hauf (6,600,138) and/or Kajikawa (JP 03-122282), and in further view of Hiramoto (5,510,158), Maeda (5,679,165), Murakami (5,431,738) and/or Miller (6,521,048) for the reasons discussed above, and taken in view of Yamazaki I (JP 61-018125) and Yamazaki II (4,987,008). Yamazaki I (see the English translation and Figs. 1 and 2) and Yamazaki II (see Figs. 3 and 4) teach that a low-pressure mercury lamp that emits UV light can be used for photochemical processing of a substrate held in a vacuum chamber. As described by Yamazaki I and Yamazaki II, when UV lamps are used to irradiate the interior of vacuum chambers for photochemical processing, the problems caused by the pressure differential across the chamber window was the same as described by Sakuma. Therefore, it would have been obvious to one skilled in the art to use the plural window system taught by Sakuma in the processing chambers of Yamazaki I and Yamazaki II, to mitigate the same problems caused by a large pressure differential.

Regarding claim 18, Yamazaki I and Yamazaki II both teach the use of an ambient of gas that includes a silicon compound, as claimed in claim 18. It is noted that Yamazaki I and Yamazaki II also teach the use of a variety of other gas compositions that also read on the gas compositions recited in claim 18.

Regarding claims 19, 20/16 and 20/18, Yamazaki II (4,987,008) teaches (see col. 3, lines 60-68 and example 4, for example) the step of photo-cleaning a silicon substrate, followed by a step of photo-CVD to deposit a coating on the silicon substrate, wherein both steps are performed "continuously using the identical reaction furnace without returning it to the condition with atmospheric pressure" (see col. 3, lines 60-64).

Claims 14, 15, 17 and 20/17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma I (WO 01/82348) or Sakuma II (6,891,131), either one in view of Hauf (6,600,138) and/or Kajikawa (JP 03-122282), and in further view of Hiramoto (5,510,158), Maeda (5,679,165), Murakami (5,431,738) and/or Miller (6,521,048), and in view of Yamazaki I (JP 61-018125) and Yamazaki II (4,987,008) for the reasons discussed above, and taken in further view of applicants' description of the prior art and/or Boyd (New large area ultraviolet lamp sources and their applications, Nuclear Instruments and Methods in Physics Research B 121 (1997), pages 349-356).

As described by applicants (see Fig. 12 and pages 3-6 of applicants' specification), when xenon excimer lamps were conventionally used to irradiate the interior of vacuum chambers for photo-oxidation (which reads on the claim 17 limitation of "oxidizing the surface to be processed"), the problems caused by the pressure differential across the chamber window was the same as described by Sakuma and Yamazaki I and II. Therefore, it would have been obvious to one skilled in the art to use the plural window system taught by Sakuma in the chamber of applicants' Fig. 12, to mitigate the same problems caused by pressure differential.

Also, Boyd provides a teaching analogous to applicants' description of the prior art. Boyd (see Fig. 5 and section 4.3) discloses an apparatus for forming a thin film comprising a xenon excimer light source, a first enclosure for receiving a substrate that is to be subjected to a thin film coating process, the first enclosure also having a gas intake port for supplying a film forming precursor gas and a gas exhaust port for exhausting the film forming precursor gas, and a transparent window comprising a first side exposed to the first enclosure and a second side exposed to a second enclosure which houses the excimer light source. Boyd teaches (see section 4.3) that the film forming precursor gas can be oxygen for forming a thin oxidation film, which reads on the claim 17 limitation of "oxidizing the surface to be processed". It would have been obvious to one skilled in the art to utilize the xenon excimer UV lamps of Boyd or applicants' admitted prior art as a substitute from the low pressure mercury UV lamps of in the apparatus of Yamazaki I and II, because Boyd and applicants' admitted prior art make clear that xenon excimer UV lamps are useful and desirable for oxidizing silicon substrates as claimed in claim 17.

Regarding claim 20/17, it is noted that photo-oxidation is also a photo-CVD process, and therefore the photo-oxidation step meets the limitations recited in claim 20/17. Further regarding claim 20, it also would have been obvious to use the photo-cleaning step of Yamazaki II with the photo oxidation step of Boyd or applicants' admitted prior art.

Applicants have argued that Tolt, Murakami, Miller and Wertheimer are taken from the CVD art or plasma processing art which are different from a light processing

apparatus as presently claimed. Applicants have argued in effect that Tolt, Murakami, Miller and Wertheimer are not analogous art.

It is noted, however, that Hiramoto (5,510,158) has been added to the rejection, and Hiramoto specifically teaches that a linearly swinging motion will desirably improve the uniformity of lamp radiation on a substrate to be treated.

As noted in the statement of the rejection, the Sakuma (I or II) apparatus also includes a substrate rotation means for improving the uniformity of radiation (col. 1, lines 31-35) onto the substrate per unit time. Therefore, Sakuma makes clear that substrate movement is desirable in a light processing apparatus for the purpose of improving the uniformity of radiation (col. 1, lines 31-35) onto the substrate per unit time.

According to *In re Wood*, 202 USPQ 171, and *In re Pagliaro*, 210 USPQ 888, analogous art is all art in the field of endeavor, plus those arts which are reasonably pertinent to the particular problem solved by the invention. According to this definition of analogous art, Maeda, Murakami and Miller are analogous art because they are taken from an art that is reasonably pertinent to the problem solved by the invention.

Maeda, Murakami and Miller all teach the step of moving a substrate in a linear reciprocating motion or swinging motion, for the purpose of causing a more uniform treatment of a substrate in a processing apparatus. These references teach that a swinging motion is a well-known alternative to or addition to the more common rotating motion illustrated by Sakuma.

It would have been obvious to use such a swinging motion as an alternative to, or in addition to, the rotation of Sakuma, because the secondary references make clear

that reciprocation or swinging was an art recognized equivalent to rotation, or an art recognized improvement to rotation used alone, for the purpose of increasing uniformity of treatment of a substrate in a processing apparatus.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Richard Bueker/
Primary Examiner, Art Unit 1792